REMARKS

By this amendment, the title has been editorially amended, claims 1-15 have been cancelled and new claims 16-17 have been added in the application. Currently, claims 16-17 are pending in the application.

The title has been editorially amended to correct the title to the title suggested by the Examiner. In view of this amendment, this objection should be withdrawn.

Claims 4, 7 and 13 and 8-9 and 14-15 were objected to because of various informalities. By this amendment, these claims have been cancelled and therefore these objections are now moot.

Claims 1-15 were rejected under 35 U.S.C. 102(e) as being anticipated by Sasaki et al. (US Patent Publication Application No. 2005/0036372). This rejection is respectfully traversed in view of the amendment to clams and the following remarks.

The present invention relates to a card information storage part (119) that is provided in a semiconductor memory device (110) to store information of the characteristics of the semiconductor memory device (110). There is also provided a file system interface control part (120) for performing, based on the stored characteristic information, a file access suitable for the characteristics of the semiconductor memory device (110). This

allows an access device (100) to perform an optimum file access via the file system interface control part (120) without awareness of the characteristics of the semiconductor memory device (110).

The semiconductor memory device of the present invention has the device information storage part for storing information on properties of the semiconductor memory device and the interface controller for performing file access suitable for the properties of the semiconductor memory device on the basis of the information and thus, the access device can achieve optimum file access without taking into accounts of the properties of the semiconductor memory device. Such semiconductor memory device can be used as an information recording media such as digital AV equipment, mobile phone terminal, PC and the like. Furthermore, since the semiconductor memory device can realize optimum file access according to the properties of the semiconductor memory device, the device operates especially suitably when it is used as the information recording medium for equipment that records high-quality AV data having a high transfer rate.

In one embodiment of the present invention, the card information storage part 119 for storing the card information containing the physical properties of the semiconductor memory card 110 and the file system interface controller 120 for

performing file access suitable for the physical properties of the semiconductor memory card 110 are provided in the semiconductor memory card 110 on the basis of the card information. Thus, the access device 100 can perform optimum file access without taking into account of the access properties of the semiconductor memory card 110. Since the access device need not deal with various semiconductor memory cards for optimum access, the amount of verification operation for dealing with the cards is decreased.

In another embodiment, when the access device 100 inputs the command to request data writing or reading processing to or from the second area 1602 of the nonvolatile memory 115 via the host interface part 111, the low-level IO interface controller 1603 performs the data writing or reading processing to or from the second area 1602 in the nonvolatile memory 115. A point different from the file system interface controller 120 is that the low-level IO interface controller 1603 performs only access control such as data writing or reading processing to or from the second area 1602 of the nonvolatile memory 115 without performing control of the file system.

In yet another embodiment, there is a path for directly calling the card interface controller 106 from the application program 105 in the access device 100 and in that a

synchronization controller 2501 is provided in the semiconductor memory card 110.

When the low-level IO interface controller 1603 performs data writing processing of management information of the file system existing in the nonvolatile memory 115, the synchronization controller 2501 updates the file system management information that the file system interface controller 120 reads to the RAM in the semiconductor memory card 110. With such configuration, the file system interface controller 120 in the present embodiment has less limitation of the achieved functions as compared to the case where only the format function is achieved as in Embodiment 3.

Subsequently, a function of the synchronization controller 2501 will be described referring to FIGS. 26 to 28. Here, as an example of the synchronization controller 2501, the case where the file system interface controller 120 achieves a read-only file system function (upper command) and the low-level IO interface controller 1603 achieves the low-level IO function (lower command) will be described. In this case, the access device 100 can control reading and writing with respect to the file system by the file system controller 1701 and access the nonvolatile memory 115 in the semiconductor memory card 110 via the low-level IO interface controller 1603. At the same time,

read-only access to the file system built on the nonvolatile memory 115 in the semiconductor memory card 110 via the file system interface controller 120 can be made.

In processing of the synchronization controller 2501, a command is received from the access device 100 (S2801). Next, referring to the received command, it is determined whether or not the command is the invalid command that cannot be recognized itself (S2802). When the command is the invalid command, the error is informed to the access device 100 to finish the processing (S2803). When the command is the recognizable command, it is determined whether or not the command is the RAW_WRITE command explained in FIG. 18 (S2804). When the command is not the RAW_WRITE command, the type of the command is determined (S2805). When the command is the upper command, the file system interface controller 120 is called and when the command is the lower command, the low-level IO interface controller 1603 is called, further, the other processing corresponding to each command is performed and the processing finishes (S2806).

When the command is the RAW_WRITE command, it is determined whether or not the writing position designated by the argument of the command is the same as the FAT 2601 read on the RAM 113 (S2807). In the example in FIGS. 26 and 27, since the FAT 2601

exists in the area of 123 sectors starting from the 234th sector, when data writing of 32 sectors starting from the 256th sector is requested by the RAW_WRITE command, a determination is made that the writing position is same.

When a determination is made that the writing position is the same, the FAT 2601 on the RAM 113 is updated by using data sent from the RAW_WRITE command (S2808). The low-level IO interface controller 1603 is called, the RAW_WRITE command is executed and the processing finishes (S2809). When determination is made that the writing position is not same, it is determined whether it is writing to the same sector as the sector of the opened directory entry (DE) (S2810).

In the example in FIGS. 26 and 27, since the file having the directory entries existing at the 480th sector and 513rd sector is opened, when data writing to the position of any of the two sectors is requested according to the RAW_WRITE command, the writing position is determined to be same. When the determination is made that the writing position is determined not to be same, the procedure proceeds to processing at S2813. When the writing position is determined to be same, referring to data transmitted according to the RAW_WRITE command, it is determined whether or not the data written to the sector including the directory entry changes the directory entry of the opened file (S2811).

In cases where the directory entry changes, when the file size, time stamp and file name are changed, some cases are included, where the directory entry itself is erased and so on. When a determination is made that the directory entry does not change, the procedure proceeds to processing at S2813. When a determination is made that the directory entry changes, the open file information (OFI) 2602, 2603, 2604 and 2605 on the RAM 113 are updated (S2812).

For example, when the file size, time stamp and file name are changed, each value in the open file information 2602, 2603, 2604 and 2605 is updated. When the directory entry itself is erased, the open file information 2602, 2603, 2604 and 2605 are cleared and updated to be a condition that a file is not opened. Finally, the low-level IO interface controller 1603 is called, the RAW_WRITE command is executed and the processing finishes (S2813).

The synchronization controller 2501 confirms a writing position in writing access to the semiconductor memory card 110 and in a case of a writing that changes data read on the RAM 113, the data on the RAM 113 is updated at same time of data writing. When the file system interface controller 120 achieves the read-only file system function, it is possible to execute processing so as not to cause inconsistency in the file system by

transmitting the file system management information in sync with the writing processing via the low-level IO interface controller 1603.

In the present embodiment, when the file system exists in the semiconductor memory card 111 and the clusters is logically continuous, only one address conversion per one optimum address unit need to be performed and thus, overhead for the address conversion processing can be reduced.

Also, in the present embodiment, the file system interface controller 120 and the low-level IO interface controller 1603 are provided in the semiconductor memory card 110 and the semiconductor memory card 110 can be accessed via any of the interface controllers. By providing the synchronization controller 2501, synchronization between accesses via the two interface controllers can be achieved.

Claim 16 is directed to the features of Embodiment 4 of the present invention. Specifically, claim 16 recites "A semiconductor memory device comprising:

a nonvolatile memory that consists of a plurality of sectors, a certain number of continuous sectors of which are grouped as a block of a minimum unit for data erase, and stores file system management information used for management in a file system;

a file system interface controller for performing file access processing to said nonvolatile memory on the basis of the file system stored therein;

a low-level IO interface controller for performing file access processing to said nonvolatile memory without the basis of the file system stored therein;

a synchronization controller for receiving an upper command which is not based on a file system of an access device and a lower command based on the file system of the access device, and for controlling said file system interface controller and said low-level IO interface controller based on the received command; and

a temporary storage memory for temporary storing file system management information read from said nonvolatile memory by said file system interface controller through accessing, wherein

said synchronization controller updates file system management information stored in said temporary storage memory when said received command is a command which changes said file system management information stored in said temporary storage memory." These features are not shown or suggested by Sasaki or the other prior art of record.

Sasaki discloses a data storing apparatus that relates to a removable card 1. The memory card 1 includes a non-volatile

semiconductor memory in which data recorded in the memory is erased batch-wise in terms of a block of a predetermined data volume as a unit, a system information storage unit in which there is stored the inner information of the data storage device, and a controller for managing control for the semiconductor memory, based on a command supplied from the host device 2. The memory card 1 is able to accept a command for initialization. When supplied with the initializing command from the host device 2, the memory card 1 is responsive to the parameters stored in the system information storage unit to effect logical formatting of a recording area on a semiconductor memory.

Many of the features recited in new claim 16 are not disclosed in Sasaki et al. According to the office action, the Examiner believed that the low-level IO interface controller was shown in paragraphs 0044 and 0045 in Sasaki et al. Also, the Examiner believed that the synchronization controller was shown in paragraphs 0005 and 0048 in Sasaki.

However, applicants respectfully submit that paragraph 0044 in Sasaki et al. only shows a register circuit 13 for storage of a control command, inner status of the memory card, various parameters and file management information.

Further, applicants respectfully submit that paragraph 0045 in Sasaki et al. only shows a data buffer circuit 14 for transient storage of writing or reading data.

Also, the description in paragraph 0048 only shows a memory I/F controller 16 for exchanging data between data buffer 14 and non-volatile memory.

On the other hand, the low-level IO interface controller of the present invention performs file access processing without the basis of file system. Further, the synchronization controller of the present invention controls the file system interface controller and low level IO interface controller. Also, the synchronization controller updates file management information as recited in claim 16. Such structures are not shown in Sasaki et al.

For these reasons, it is believed that Sasaki et al. do not show, teach or suggest the presently claimed features of the present invention recited in claims 16 and 17.

Also, Sasaki et al. and the other prior art references of record do not teach, show or suggest the presently claimed features of the present invention. Accordingly, applicants respectfully submit that the application is in condition for allowance and an action to that effect is respectfully requested.

If there are any questions or concerns regarding the amendments or these remarks, the Examiner is requested to telephone the undersigned at the telephone number listed below.

Respectfully submitted,

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